THE FUTURE BEGINS WITH A PLAN.

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Rapid Transit Development Project

RAPID TRANSIT DEVELOPMENT PROJECT

PHASE I. SUMMARY ABSTRACT

January, 1975

PREFACE

This booklet is an abstract of the results of the Rapid Transit Development Project Phase I work. It is based on the findings of the Fall, 1974 De Leuw, Cather and Company Phase I Reports plus discussions and communications with the Transit District Board of Control, the Santa Clara County Transportation Commission, individual cities, and the Public at large. Copies of the De Leuw, Cather Reports are available at all Public libraries.

GOALS FOR TRANSIT IN SANTA CLARA COUNTY

1. Santa Clara County will provide a transit system capable of attracting a major share of all travel.
2. The transit system will be multi-modal with specialized service.
3. The transit system will serve all the people.
4. The transit system will enhance the environment.
5. The transit system will be economical.
6. The transit system will provide quality service.
7. The transit system will be safe.
8. The transit system will relate to the Bay Region.
9. The transit system will be developed in phases.

MANDATE

TRANSPORTATION COMMISSION MANDATE

"A goal of 30% transit ridership . . . . "

or in other words a public transportation system

- designed to *compete* successfully with the private automobile
- that will allow households to eliminate the need to own and operate second and third cars
- that reduces the necessity for private transportation expenditures

INTRODUCTION

The objective of the Santa Clara County Rapid Transit Development Project is to develop the framework for a County-wide rapid transit system in Santa Clara County. On October 9, 1974 the Draft report of the RTDP Phase I Summary was presented to the individual cities for review. Phase I studies basically involved analysis of the transportation situation in the County, evaluation of rapid transit technology, preliminary corridor identification, and identification of specific impact factors. This abstract highlights the complex discussions, findings and conclusions of the Phase I Summary Report.

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The General Transit Plan of the Santa Clara County Transit District requires the development of a balanced system of transportation services for the people of the County. These services will provide high quality, convenient, safe, economical and uncongested mobility using both traditional and innovative techniques. The CTD system will enhance the environment through the establishment of standards which will minimize environmental degradation such as air, noise and visual pollution and community disruption. The system will be multi-modal. It will consist of four fundamental levels of service: regional rapid transit, express transit, local transit and specialized transit services.

The Transportation Commission and the County Transit District have established an ambitious transit ridership mandate. The goal for transit in Santa Clara County is to develop a public transit system which will attract ridership amounting to 30% of the daily person trips in the County.

RTDP Phase I Results and Conclusions

Peak Hour Congestion

THE PROBLEM

The RTDP Phase I report establishes that a mobility problem is developing in Santa Clara County due to overdependence on the private automobile. This situation will be severely aggravated by a projected increase in the daily travel demand from a present 3.8 million trips to 6 million person trips by 1990. To achieve the 30 percent market penetration mandate, a public transportation system is required which will attract approximately 1.8 million riders daily in 1990.

FINDINGS

Fixed Guideway Element

Phase I study indicates that a public transportation system which responds to the adopted mandate should consist of a high performance, grade-separated, fixed guideway, arterial transit network and collection-distribution systems serving short trips. The most feasible fixed guideway concept for the County appears to be an automated MCRT (Medium Capacity Rapid Transit) elevated network for which the necessary technology is currently available. The MCRT arterial system would operate 20-30 passenger vehicles over a minimum 140 mile network with capacities of 15,000 passengers per hour per line in each direction at 40 second minimum headways in peak travel periods. Vehicles would be deployed in single car and multi-car train operations. Typical MCRT vehicles are shown. The arterial guideway network proposed is a grid pattern in principal travel demand corridors with stations at about one mile intervals (see Figure 1). Network layouts of 230, 315, and 550 miles were also evaluated but it was found that the added payoff in service for the extra mileage is modest for the larger investment required. A network of less than 140 miles would not be sufficient to connect all the major developed sub-areas of the County. The design phase of the MCRT system should be completed within the next 5 years to enable full scale construction activity beginning in 1980. This would permit the implementation of service by stages to be complete by 1990.

Typical MCRT Guideway

MCRT Vehicle and Station Platform

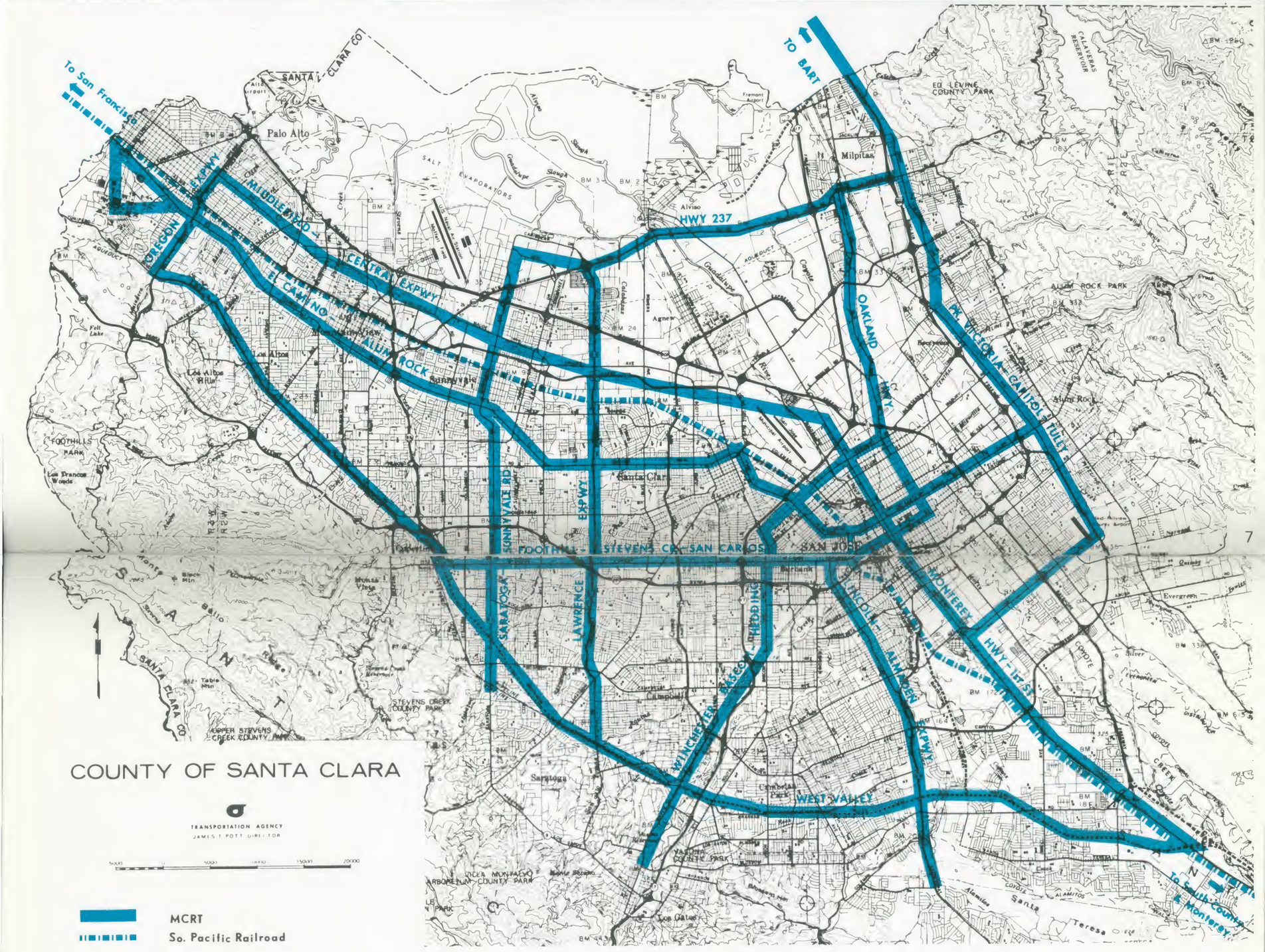
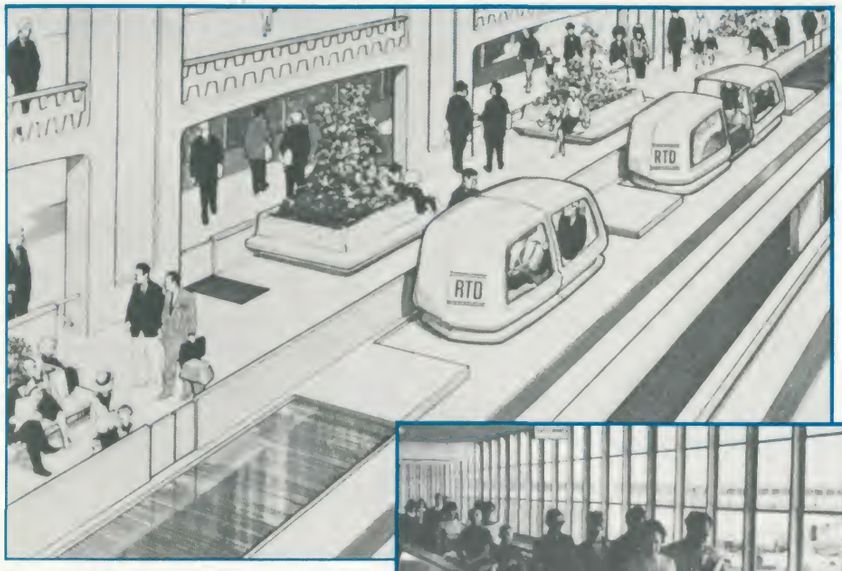


FIGURE I

MEDIUM CAPACITY RAPID TRANSIT
Proposed 140 Mile Arterial Guideway Network



People Mover

Moving Sidewalk

FINDINGS

Collection & Distribution

In order for an arterial fixed guideway network to be effective, a collection-distribution (C/D) system is also required. This system must be able to serve all fixed guideway patrons with trip ends greater than ¼ mile from a network station. The problem of collection and distribution can be lessened by land use policies supportive of rapid transit usage through encouragement of development in proximity to guideway stations.

About one-half of all urban trips are short trips of less than six miles in length. Thus the collection-distribution element must substantially penetrate the short trip market in order for the entire system to provide a level of service sufficiently attractive to achieve Transit District goals.

Bicycles

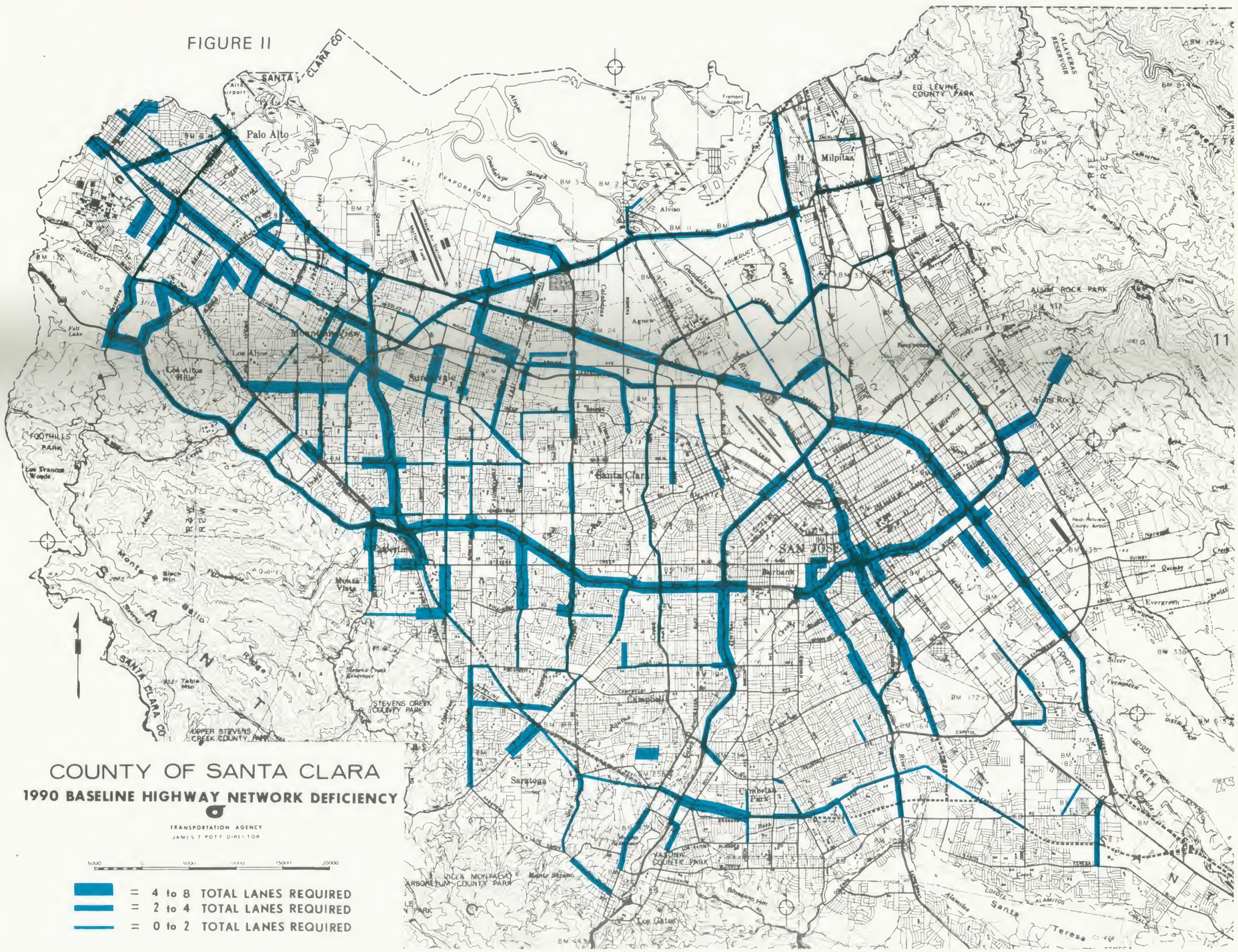
Arterial/Personalized Transit

FINDINGS Alternative Transportation Choices

Alternative transportation choices were considered in Phase I and found less attractive than the MCRT concept.

I. The transportation system that would be present in Santa Clara County in the absence of a substantial public transportation effort is the "Baseline" alternative. This system includes the additional planned highway facilities of 250 lane miles by 1990 and the existing and planned SCCTD bus system. Study shows that this system is clearly inadequate for future needs and desires. There will be consistent shortages of two to six lanes on all major links of the 1990 highway system due to projected peak period trips (Figure II). The average work trip in 1990 using the Baseline system will take 35 minutes as compared with an average of 21 minutes in 1970.

FIGURE II



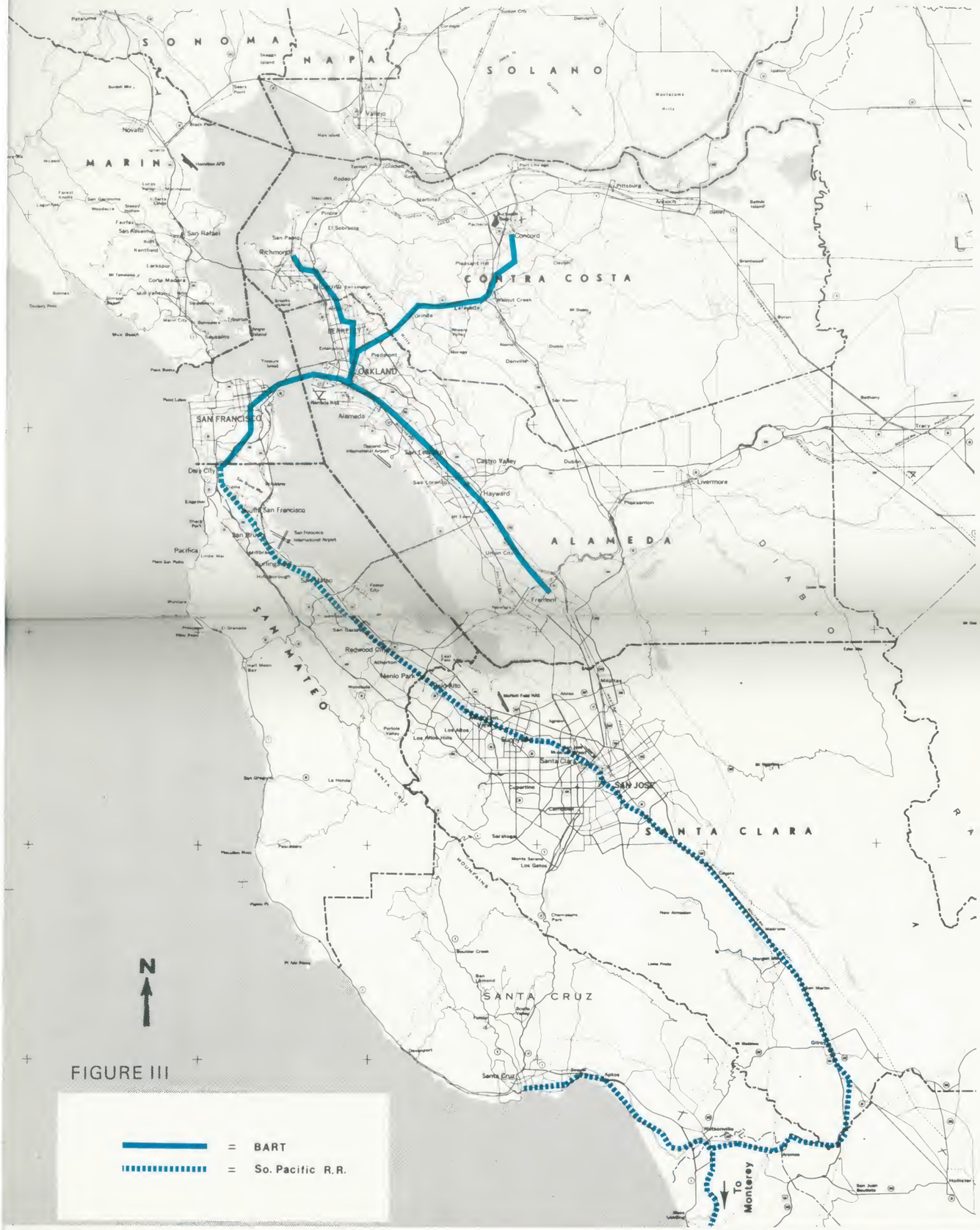


FIGURE III

Alternative Transportation Choices

2. Phase I study shows that a solution to the transportation problem in Santa Clara County requires a system of a network nature to reach the number of trip-end locations necessary for mandated service. A single corridor rapid transit system such as BART or an upgraded S.P. would not provide sufficient service to effectively alleviate the intra-County transportation problem alone. However, a regional corridor link which provides a portion of the intra-County requirements as well as through service to the neighboring counties should be made an integral part of the network system. Figure III shows the BART routes and Southern Pacific service in the Bay Area. These routes can be upgraded and supplemented but they will be inadequate without an extensive MCRT network.

Alternative Transportation Choices

Exclusive Bus Lanes

3.

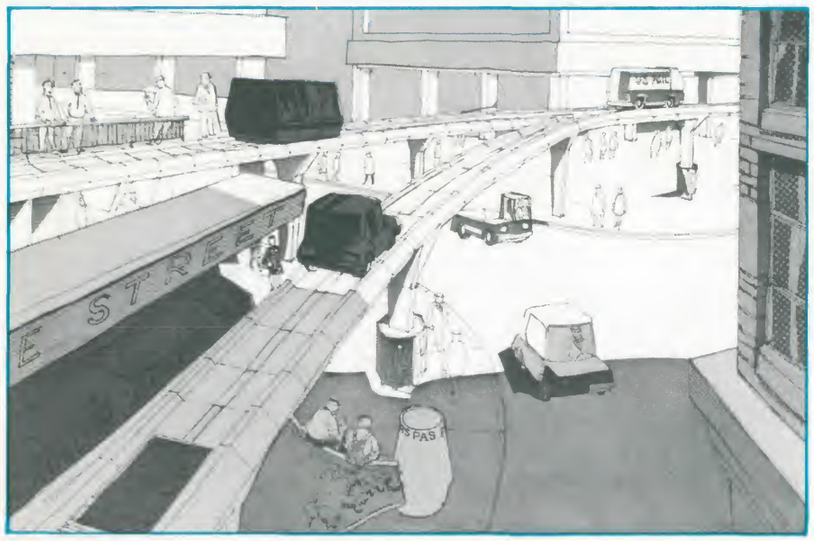
Although an extensive bus system, including exclusive bus roadways, may approach the 30% mandate there are serious operational, design and environmental problems which would have to be overcome before an all bus system could adequately respond to the mandate. This alternative is therefore not recommended.

TABLE I
TRANSPORTATION SYSTEM TECHNOLOGY STATUS

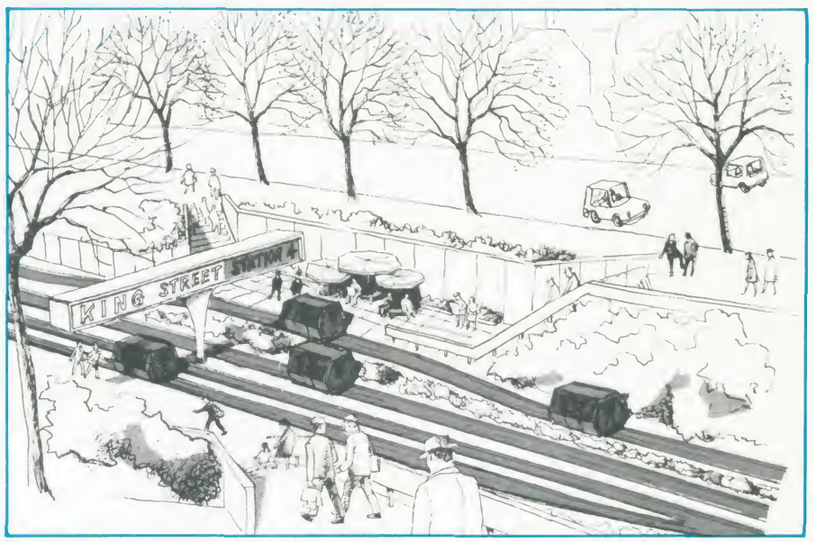
	Operational	In Development and Demonstration	In Research and Development
Buses	Express Arterial Dial-a-Ride Rapid Transit Bus		
HCRT	Conventional Automated		
MCRT	Shuttles	Networks	
PRT		High Performance	High Capacity
Dual Mode			All Types

4.

Sophisticated rapid transit networks such as PRT (Personal Rapid Transit) or Dual-Mode Transit lack significant technological progress. PRT requires a control system adequate for the short vehicle headways and high speeds necessary for the desired level of service. Dual-Mode Transit technology must offer both driver-operated and automated control components. The prolonged time and high costs necessary for development of these more advanced systems eliminate them as immediate alternatives. Table I indicates the status of transportation system technology development.



Dual-Mode Guideway



PRT and Guideway

FINDINGS

Impact of system achieving 30% Mandate

It is apparent in Phase I of the RTDP that the installation of a public transportation system consisting of at least 140 miles of an arterial fixed guideway and complementing C/D elements meeting the 30% mandate would yield a positive overall impact on the County.

With the development of this system, Santa Clara County residents could realize a net savings of $20 - $70 million annually in total transportation expenditures over the 1990 baseline alternative (Table II). In addition the annual time savings for the people still using the road system will be $120 - 180 million a year ($3/hour). Phase I findings show that the average time for the remaining trips on the 1990 road system would be reduced by 10 to 15 minutes.

Benefits in the macro-level environmental impacts investigated in Phase I are directly related to reduced dependence on the private automobile. Approximately 2450 fewer acres would be needed for roads and off-street parking by employing the above transit system in place of the 1990 baseline alternative. Projections also show that all listed categories of air pollutants related to automobile use will be further reduced in addition to any reductions caused by the Environmental Protection Agency's emission control program. The net 1990 transportation energy savings possible from the implementation of the proposed transit system would amount to about 18 percent.

Impact of system achieving *less* than 30% Mandate

The commitment by the County to a system reaching a trip market penetration below the 30% level would result in a net increase in the overall transportation cost. Such a system would not serve enough trips to enable the total automobile savings to compensate for the public transportation system costs.

The operation of a less ambitious public transportation system in Santa Clara County would yield fewer positive social, environmental, energy and land use impacts since dependence on the private automobile would be reduced to a lesser degree. Compared to the recommended alternative, to install a system with a lower level of service would have the effect of spending more money only to save less energy, alleviate less air pollution and save less land from roads and parking areas.

TABLE II

NET SAVINGS IN TOTAL TRANSPORTATION COSTS

(Millions of Dollars Annually, 1974 Prices)

* Plus highway addition costs

** Minus highway addition costs

Alternative	Auto Operating Cost Savings	Auto Capital Cost Savings	Total Cost Savings	Public System Operating Costs (Guideway & C/D)	Public System Capital Costs (Guideway & C/D)	Total Public System Costs	Net Savings In Total Transportation Costs
System that meets RTDP Mandate	$230	$50-100	$280-330	$160	$100	$260	$20-70
Congestion Elimination System	150	20	170	160	110	270	-100
Extensive Bus System	80	10	90	90	10*	100*	-10**
Extended Highway System	0	0	0	0	100	100	-100
Baseline Alternative	0	0	0	0	0	0	0

FINDINGS - Financing

The problem of financing a system responding to the County's transportation needs is significant. For the rapid transit element of a system meeting the 30% mandate in 1990, the financing requirements will occur in three stages. The cost of an engineering, testing and demonstation program from 1975 to 1980 will be approximately $75 million, or $15 million per year. The cost of constructing a 140 mile MCRT network in the period from 1980 to 1990 in 1974 dollars would be about $2.4 billion. The cost of operating the network beginning in 1990 would amount to about $70 million annually. These costs are shown by household in Table III. In addition, the collection-distribution element will cost about $120 million in capital expenditures and $90 million annually to operate (1974 dollars).

In order to finance the system, a method needs to be found to transfer the net savings and other benefits realized by the people to pay for the transit system. A financing plan must be developed soon which will insure a revenue stream which would not be adversely affected by inflation. Such a plan should include revenues from fare income, various forms of local taxes, and participation in State and Federal Government transportation funding programs. The following three financing alternatives have been analysed by Bartle Wells Associates, municipal financing consultants, as an aid to the District in establishing a fiscal approach. These alternatives consider the financial situation for fiscal years 1974/75 through 1979/80.

TABLE III

FINANCING REQUIREMENTS VERSUS AUTOMOBILE COSTS (Annual Costs Per Household in 1974 Prices)		1975-79	1980-1990	1990
	140-Mile Guideway System with Collection-Distribution	$ 40	$ 200*	$ 500*
	Auto Costs for 1-Car Household	1,800	1,800	1,800
	Auto Costs for 2-Car Household	3,200	3,200	3,200
	* Assumes repayment of capital expenditures over 40 year period between 1980 - 2020.			

Financing Alternatives

A. Under this alternative revenues would consist of fares, Mills-Alquist-Deddeh Act funds (portions of existing State sales tax monies to be used for transit purposes), SCA 15 funds (portions of State gas tax revenues allocated for transit), Federal Mass Transit Operating Aid funds, and Federal Capital Grants. Expenditures would consist of existing Arterial-Personalized Transit (APT) maintenance and operation costs and existing Federal Capital Grant Projects.

At the end of fiscal year 1979/80 there would be a net cumulative deficit of almost 19 million dollars. Alternative A would not provide adequate local matching funds to enable the District to secure the maximum available State and Federal transit subsidy funds.

B. Under Alternative B, the same revenue sources as in Alternative A were used. In addition, a Local Property Tax Levy was assumed to enable the maximum utilization of available Mills-Alquist-Deddeh and Federal Mass Transit Aid funds.

Assuming the same APT and Capital Grant expenditures, this financing alternative would create a cumulative surplus of approximately 50 million dollars at the end of fiscal year 1979/80. This 50 million dollars could be applied to the estimated 75 million dollar cost of a RTDP Phase II Project (Design, Engineering, and Technology Development), local matching funds to secure additional capital grants for expansion of the APT System, or some combination of both.

The Property Tax rate levy assumed under Alternative B to maximize other available resources varied from 17.5 cents to 16.9 cents per $100 of assessed valuation. This funding alternative would require approval by a majority vote of the County Electorate.

C. Alternative C also assumes the same revenue sources as in Alternative A, with addition of a ½ of 1 percent County wide sales tax. This funding approach also allows the maximizing of all currently available Mills-Alquist-Deddeh and Federal Mass Transit Aid funds.

Again assuming the same APT and Capital Grant expenditures as in Alternative A and B, Alternative C would produce an additional 122 million dollars by fiscal year 1979/80 that would be available for other transportation needs and programs, including:

- Completion of Phase II of RTDP (Design, Engineering, Technology Development)
- Institute APT system expansion
- Institute APT System replacement
- Institute an advanced land acquisition program for RTDP
- Support various low cost capital improvement programs

This alternative would also require approval by a majority vote of the County Electorate.

Taxing Measure. A taxing measure to secure local revenue may be submitted to the County Electorate in 1975. It is mandatory that the County Transit District develop a source of local matching funds in order to continue the existing transit services and to undertake any significant public transportation system improvement programs.

GLOSSARY

Arterial – A main route or street

Arterial-Personalized Transit (APT) – A functional transportation service concept which includes a network of regularly scheduled arterial routes augmented by demand-responsive transit service.

BART – Bay Area Rapid Transit (District); provides high capacity rapid transit service connecting cities from Fremont to Richmond and Concord to San Francisco and Daly City.

Collection-Distribution – Local transportation link between actual trip end locations and the main route.

Corridor – A geographical patronage drainage area comprising a broad band following a general directional flow and contributing vehicles or passengers to highways or transit lines.

Dual-Mode–Public transportation mode in which the same vehicles operate as automated rapid transit vehicles on fixed guideways and as independently operated vehicles on streets.

Peak Hour– A period during the day when the demand for transportation services is the greatest.

People Mover – General term used to describe various micro systems (including continuous belt systems, 'free' vehicle ideas, and Personal Rapid Transit) providing short-haul Collection and Distribution, usually in Major Activity Centers.

Person Trip – Each one-way trip made by one person.

Personal Rapid Transit (PRT) – Public transportation system with small automated vehicles (2 to 6 passengers) operating on exclusive Guideways, traversing extensive and complex areawide networks in response to origin and destination desires of individual passengers.

Rapid Transit – Public transportation systems operating on exclusive right-of-way.

Regional Rapid Transit – Exclusive right-of-way transit connecting the various cities of a region. The San Francisco Bay Area region includes nine counties: Alameda, Contra Costa, Marin, Napa, Solano

Exclusive Bus Roadways– Street or highway lanes reserved for buses only.

Express Transit – Transit service operating on a limited stop basis.

Fixed Guideway Transit – Transit mode in which vehicles are guided by rails or tracks on an exclusive right-of-way.

General Transit Plan – Document containing the general declarations of the Transit District's intentions regarding the transit service to be provided.

Grade Separation – Separation of intersecting streams of traffic by the provision of elevated structures or underpasses.

HCRT – High Capacity Rapid Transit – high speed rail rapid transit, e.g., BART.

Major Activity Center (MAC) – Distinct geographical areas characterized by small size, large transient populations, and heavy traffic volumes and densities, e.g. CBD, major air terminals, large universities, large shopping centers, industrial parks, sports arenas.

MCRT – Medium Capacity Rapid Transit – 20 to 30 passenger vehicles operating on fixed guideways at medium speeds serving principal traffic demand corridors.

Multi-Modal – Consisting of more than one transportation category, i.e., automobiles, bicycles, buses, trains, etc.

San Francisco, San Mateo, Sonoma, Santa Clara.

Right-of-Way – That land area or other space upon which roads or guideways (including stations, terminals, etc.) are placed, including zones required for safe, efficient operation of the system or systems.

RTDP – Rapid Transit Development Project

Santa Clara County Transit District (S.C.C.T.D.) – Primary transit agency within Santa Clara County formed after June 6, 1972 approval of the electorate, governed by the Santa Clara County Board of Supervisors.

Santa Clara County Transportation Commission – 25 member advisory body to the Board of Supervisors. The Commission consists of representatives from each of the 15 cities in the County and various segments of the Community.

S.P. – Southern Pacific Railroad – S.P. operates passenger train service connecting cities between San Jose and San Francisco.

Transit District Board of Control – The policy making body for the Rapid Transit Development Project; consists of the County Board of Supervisors, two Metropolitan Transportation Commissioners from Santa Clara County, and one each from Alameda County and San Mateo County.

Santa Clara County
Rapid Transit
Development Project

Phase One Summary Report

Preliminary Findings and Conclusions

December 1974

Figure IV-4
HIGH CAPACITY RAPID TRANSIT (HCRT)
BART LOOP - PALO ALTO TO FREMONT

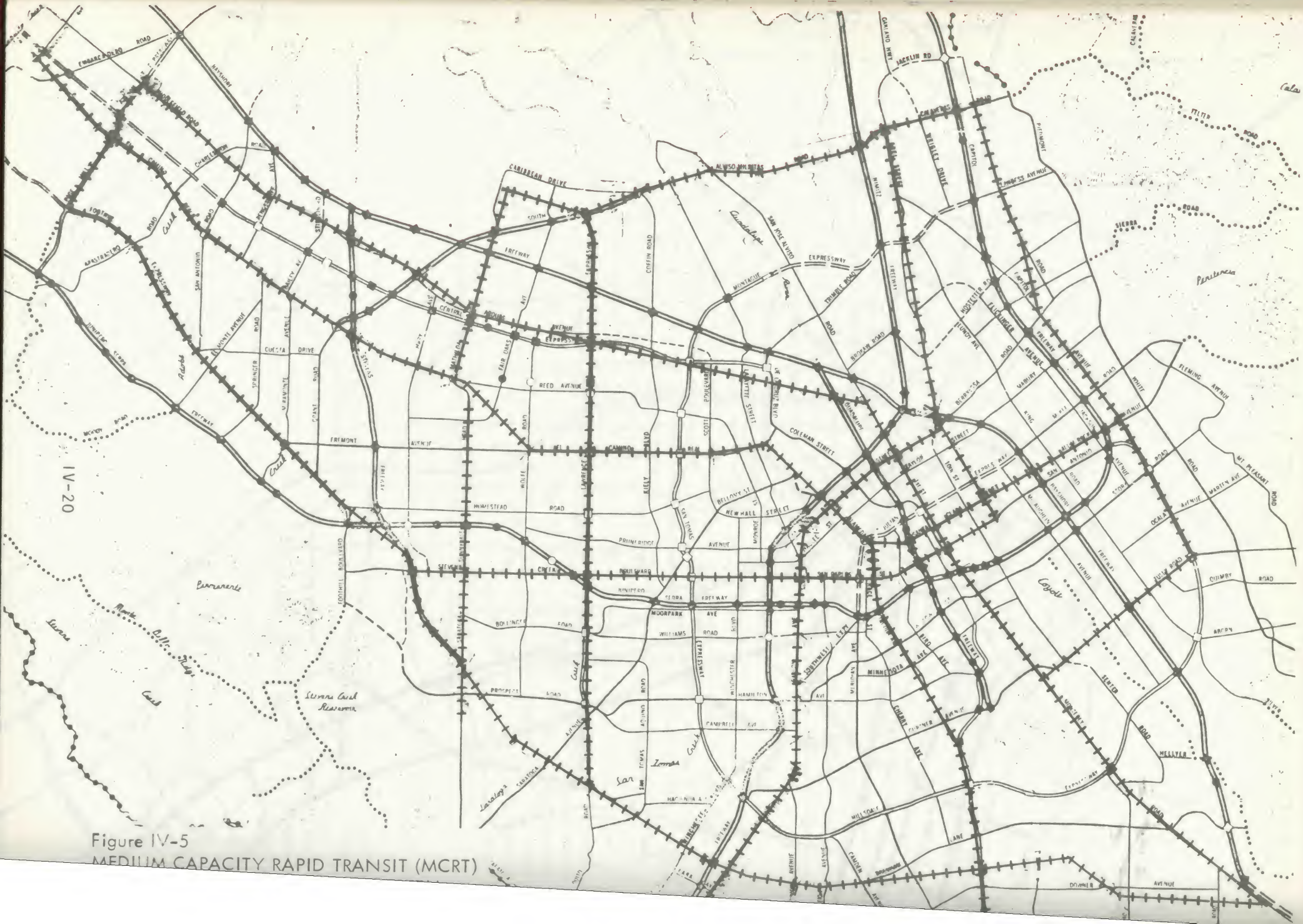


Figure IV-5
MEDIUM CAPACITY RAPID TRANSIT (MCRT)

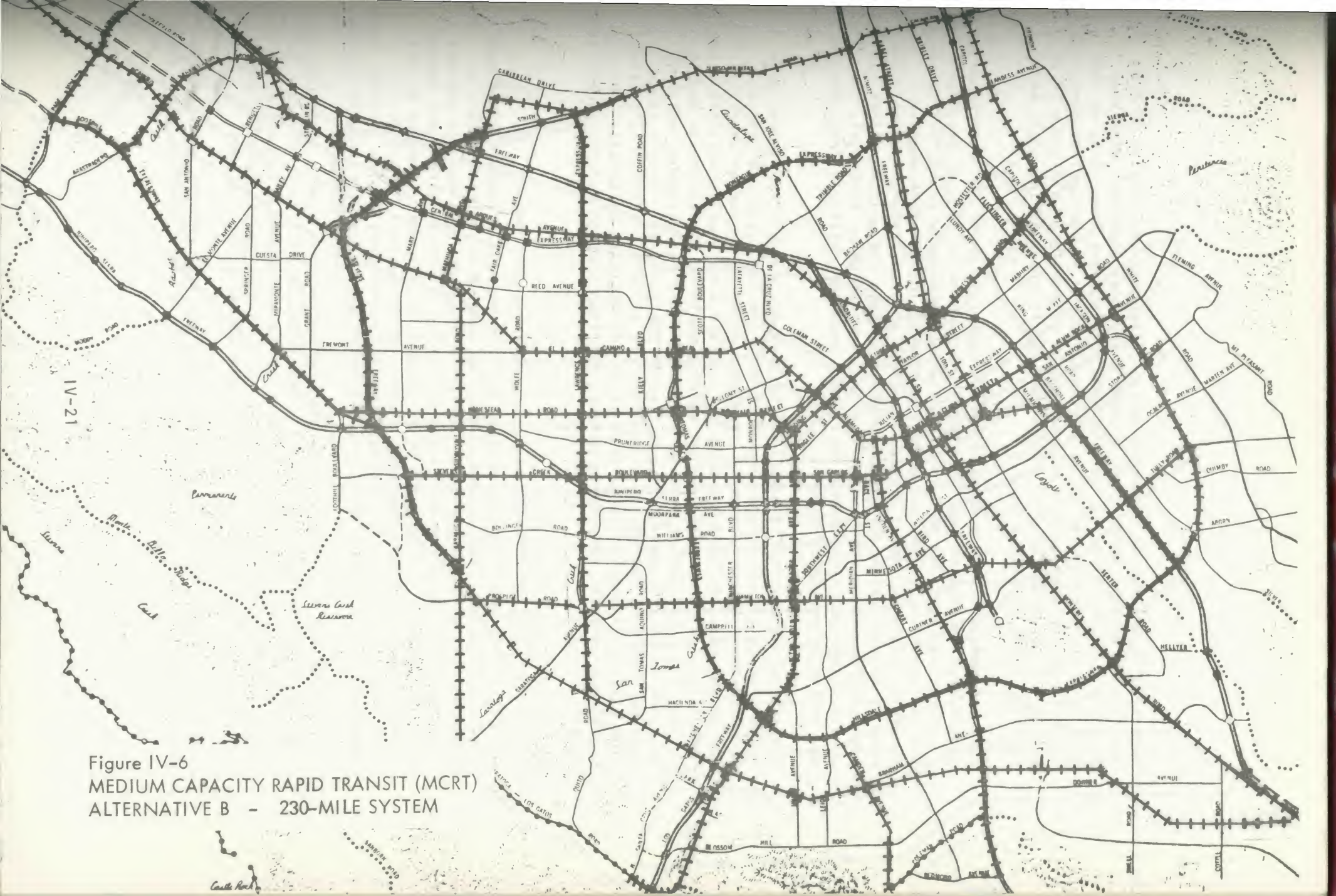


Figure IV-6
MEDIUM CAPACITY RAPID TRANSIT (MCRT)
ALTERNATIVE B - 230-MILE SYSTEM

Figure IV-7
PERSONAL RAPID TRANSIT (PRT)
ALTERNATIVE A - 315-MILE ONE-WAY SYSTEM

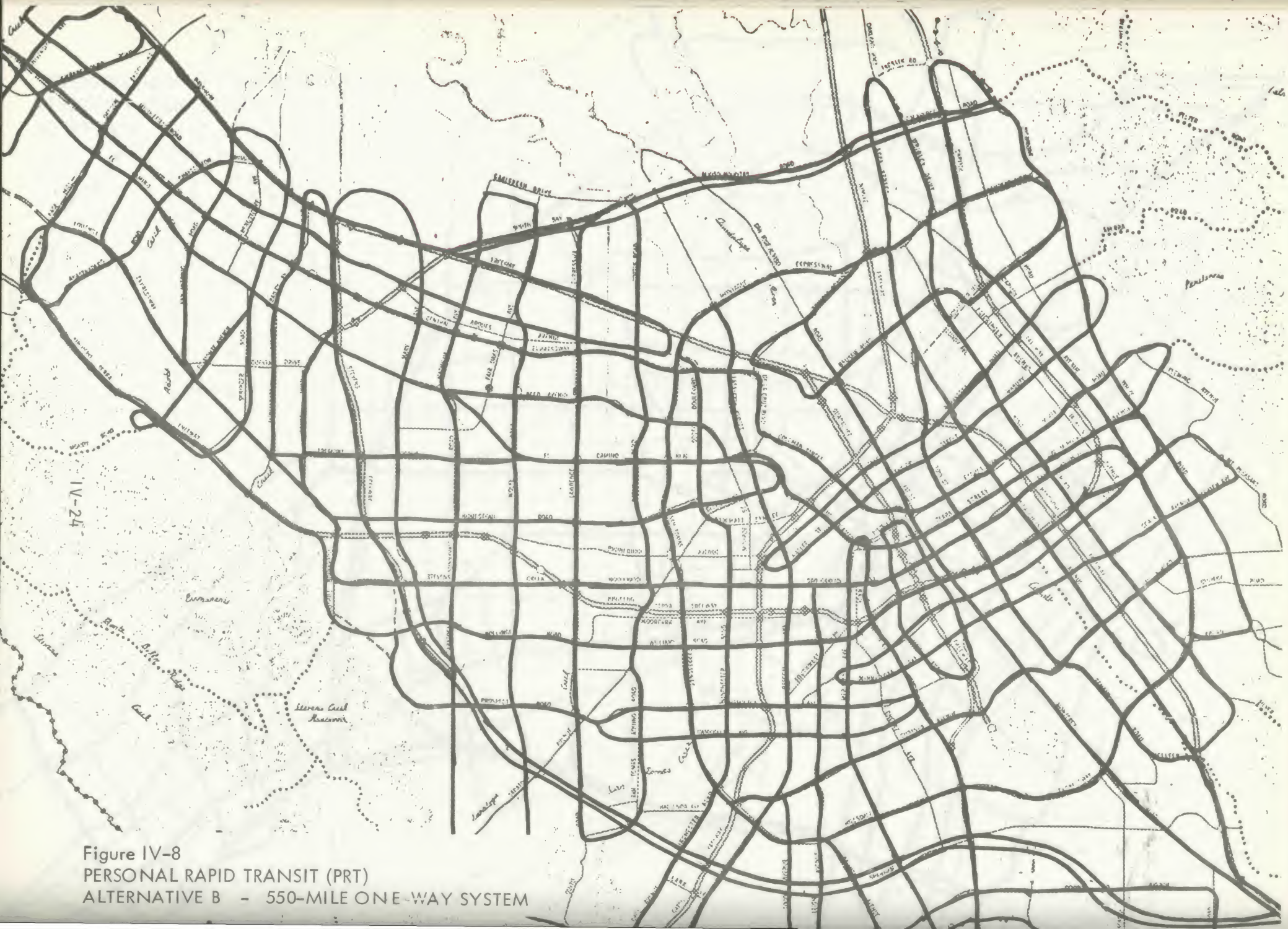


Figure IV-8
PERSONAL RAPID TRANSIT (PRT)
ALTERNATIVE B - 550-MILE ONE-WAY SYSTEM